

Math 129 (Fall '05) - Sample Exam 1 - Kennedy

WARNING: This is a past exam I gave. You should not assume that if a certain topic does not appear here it will not appear on our exam.

1. (12 points) Find the following

$$\int \cos \theta (2 + \sin \theta)^3 d\theta$$

2. (12 points) Find the following

$$\int \sin(7x) \sin(2x) dx$$

3. (12 points) $\sin^{-1} x$ is the same as $\arcsin x$. Use integration by parts to find

$$\int \sin^{-1} x dx$$

4. (12 points) Find the following

$$\int \frac{dx}{\sqrt{3 + 2x - x^2}}$$

5. (14 points) The velocity of an object as a function of time is

$$v(t) = te^{-kt^2}$$

where k is a positive constant.

(a) Find the distance this object travels between the times $t = 0$ and $t = T$. (Of course your answer should depend on k and T .)

(b) Find the distance it travels starting at time $t = 0$ if we wait forever.

6. (8 points) The table below gives the velocity of an object at times $t = 0, 1, 2, 3, 4$. Estimate the distance travelled between $t = 0$ and $t = 4$ using the LEFT, RIGHT and TRAP approximations.

Time, t	0	1	2	3	4
velocity, v	6	7	9	8	7

7. (12 points) For the integral

$$\int \frac{4}{x^3 + 2x^2 + 4x} dx$$

(a) Which of the following partial fraction decompositions should you use?

$$\frac{A}{x} + \frac{Bx + C}{x^2 + 2x + 4}$$

$$\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^2 + 2x + 4}$$

$$\frac{A}{x} + \frac{Bx^2 + C}{x^2 + 2x + 4}$$

(b) Find A, B, C . You need not find the integral.

8. (10 points) Determine whether the following improper integral converges and explain your reasoning.

$$\int_0^{\infty} e^{-x} (1 + \cos x) dx$$

There are lots of ways to do this. Grading will be based on how well you explain your reasoning.

9. (8 points) The table below contains four of the five approximations LEFT, RIGHT, MID, TRAP and SIMPSON to $\int_0^1 f(x) dx$ for several values of N . The exact value of the definite integral is known to be 2. Also, the function $f(x)$ is increasing and concave down on the interval from $x = 0$ to $x = 1$. For each column (A,B,C,D) determine which approximation method is shown. This will be graded based on your answer only.

N	A	B	C	D
4	1.974232	1.581533	2.000017	2.366931
8	1.993570	1.797221	2.000001	2.189920
16	1.998393	1.900219	2.000000	2.096568

Answer